

NOTES ON THE GENUS *MESEMBRYANTHEMUM* L.

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ABSTRACT

The history of the nomenclature and typification problem of *Mesembryanthemum* is reviewed. The taxonomic position of the genus is briefly outlined. A new name, *M. horridum*, is given for the homonym *M. setosum* (L.Bol.) L.Bol. A discussion of a possible infrageneric structure is included.

UITTREKSEL

AANTEKENINGE OOR DIE GENUS *MESEMBRYANTHEMUM* L.

Die geskiedenis van die probleem rondom benaming en tipering van *Mesembryanthemum* word hersien. Die taksonomiese posisie van die genus word kortliks geskets. 'n Nuwe naam, *M. horridum*, is vir die homoniem *M. setosum* (L.Bol.) L. Bol. gegee. 'n Bespreking van 'n moontlike infragenerieke struktuur word ingesluit.

Key words: *Mesembryanthemum*, lectotype, Mesembryanthemaceae, nom. nov., western Cape.

INTRODUCTION

In the course of research for a revision of the genus *Delosperma* N.E.Br. by the second author, a homonym in the genus *Mesembryanthemum* was discovered which is in need of a previous or new name. It is not surprising to find a homonym considering that over 1 000 specific epithets have been proposed in the genus *Mesembryanthemum*. The vast majority of these names have been transferred to the over 100 segregate genera described by N.E. Brown, H.M.L. Bolus, G. Schwantes and a few others. The genus *Mesembryanthemum* L. as emended by Bolus (1939) is now restricted to approximately 40 species. It is this current interpretation of the genus which is of concern in this note.

GENERIC HISTORY

The genus *Mesembrianthemum* was originally proposed by Breyne (1689) who referred to the afternoon opening of the flowers in the name. The spelling was later changed from the original *Mesembrianthemum* to *Mesembryanthemum* by Dillenius (1732) who changed the meaning of the name as

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well (to "a flower with the pistil in the centre"—not a very distinctive meaning). In this same work, Dillenius discussed the history of the group up until his own time and provided a dichotomous key to individual species and species groups.

Linnaeus is credited as the author of the genus in modern plant taxonomy since all nomenclature dates only from his *Species Plantarum* (1753). Bolus (1928) attributed the original name (and spelling) to Hermann and the spelling change to Linnaeus. But this is completely incorrect as Hermann's last work (published posthumously in 1698) still used the ancient *Ficoides* in place of *Mesembryanthemum*, and none of Linnaeus' major botanical works predate Dillenius' publication. An accurate account of the early history of the name *Mesembryanthemum* is presented in Jacobsen (1960) and in Herre (1971).

The concept of the genus as encompassing all plants which are termed "vygies" or "ice-plants", as intended by Linnaeus, lasted almost two-hundred years until the early part of this century. It was through the work of N.E. Brown that the separation of this group of plants into many genera based primarily on fruit characters was initiated. The use of fruit or capsule characters to segregate the many genera of the family Mesembryanthemaceae (Aizoaceae *sensu lato*) continues today although there are at present attempts to utilise epidermal characters to refine the current classification of the family (Ihlenfeldt and Hartmann, 1982).

After the removal from *Mesembryanthemum* of numerous species into other genera, a new definition of the genus was required. The first to provide such an emended description of the genus *Mesembryanthemum* was Brown (1925a) who very clearly and precisely chose *M. umbellatum* (*Ruschia umbellata* in current nomenclature) as the lectotype of his refined genus. With his selection of a lectotype for *Mesembryanthemum* and the simultaneous publication of a key to the many newly separated genera (1925b), Brown began a rivalry which spanned the two hemispheres and involved G. Schwantes in Germany and H.M.L. Bolus in South Africa, all three major contributors to our knowledge of the Mesembryanthemaceae.

Schwantes was the first to object to Brown's lectotypic choice (1927) by discovering that the characters of *Mesembryanthemum umbellatum* did not match the characters of *Mesembryanthemum* in Brown's published key (i.e. the presence of a tubercle in the fruit of *M. umbellatum* and the lack of such under *Mesembryanthemum* in the key). Thus convinced that Brown's error was taxonomically and/or nomenclaturally unsatisfactory, Schwantes chose a new lectotype for *Mesembryanthemum* in *M. tenuifolium* (*Lampranthus tenuifolius* in current nomenclature). Brown admits his error as being a mistake in the key (1930) but justifiably claims that the error in no way invalidates his lectotype for the genus.

Bolus took offence to the type selections of both Brown and Schwantes. Not to be outdone by her European counterparts, she decided to declare her own choice for a lectotype of *Mesembryanthemum* as *M. nodiflorum* (1939). She published her opinion in spite of a personal letter from Schwantes in August 1935, suggesting that she not publish another type for *Mesembryanthemum* and therefore create even more nomenclatural nightmares than previously existed. Bolus disclaims Brown's choice on account of his supposed misinterpretation of the Linnaean description of the genus but her argument for her choice seems no more convincing than his. Possibly because Brown had died prior to Bolus' publication and her strong influence on research in the family, it is this last emended description by Bolus which attracted the most support.

Unfortunately, the matter could not rest with the Bolus definition of the genus because under the *International Code of Botanical Nomenclature* (Article 11; Stafleu, 1978), the earliest validly published work takes precedence. Consequently Ihlenfeldt and Straka (1972) proposed to have *Mesembryanthemum* L. emend. L. Bol. conserved over both emendations of the genus by Brown and Schwantes. Their proposal was approved (McVaugh, 1974) although the reasons supporting the approval seem inconclusive. The committee suggests that the Bolus concept is in well-established usage and the Brown concept would require hundreds of new combinations.

Although the Bolus concept of the genus was used in Europe and in South Africa, it was not of universal acceptance. Indeed in South Africa, both editions (1926, 1951) of *The Genera of South African Flowering Plants* by Phillips use Brown's concept of *Mesembryanthemum*. In Australia, Blake (1969) also uses the genus *Mesembryanthemum* according to the concept of Brown and lists *Gasoul* Adanson as the genus for those species known to Bolus as *Mesembryanthemum*. In California, the Brown concept is implied by the utilisation of the genus *Gasoul* for those species of *Mesembryanthemum* under the Bolus idea (Munz, 1974). And in *Index Nominum Genericorum* (Farr et al., 1979), *M. umbellatum* is listed as the lectotype of the genus *Mesembryanthemum*. Even in *The genera of the Mesembryanthemaceae* (1971), Herre lists in error *M. crystallinum* as the type of *Mesembryanthemum* (this is the type of *Cryophytum* N.E. Br., the equivalent of *Mesembryanthemum* of Bolus).

In regard to the hundreds of new combinations, the Brown concept of *Mesembryanthemum* corresponds with the present-day genus *Ruschia* Schwantes; and of the over 350 *Ruschia* species currently accepted, almost 200 have combinations in *Mesembryanthemum*. Of the remaining species without *Mesembryanthemum* combinations, many if not most would likely be reduced to synonymy in a modern revision of the group (none of which exists though there is one started). The close to 50 species of *Mesembryan-*

themum sensu L. Bolus would not add to the "combinationes novae" avalanche since all but four have combinations in *Cryophytum* N.E. Br., the genus which coincides with the Bolus *Mesembryanthemum*.

It appears the conserved concept of *Mesembryanthemum* L. emend. L. Bolus may not have had as convincing evidence for its acceptance as previously thought. The idea of *nomina conservenda* should not be hastily decided but a thorough and complete investigation should be conducted before a conclusion is rendered. In accordance with the *International Code of Botanical Nomenclature* (Articles 14 and 15), we must accept *Mesembryanthemum* L. emend. L. Bolus as the accepted definition with *M. nodiflorum* as the lectotype.

TAXONOMIC DISCUSSION

Even using the accepted definition of *Mesembryanthemum* provided by Bolus (1939), there is still some taxonomic controversy as to which (or all) of several closely allied genera should be included in *Mesembryanthemum*. The genus *Cryophytum* N.E.Br. is certainly a synonym of the genus but other genera like *Callistigma* Dinter et Schwantes, *Derenbergiella* Schwantes, *Eurystigma* L. Bolus, *Halenbergia* Dinter, *Hydrodea* N.E.Br., *Opophytum* N.E.Br., in fact all of the subtribe Mesembryantheminae Ihl. Schwant. & Straka except *Synaptophyllum* N.E. Br., might easily be included under *Mesembryanthemum* with only a slight modification of the Bolus definition. All of these genera have peculiarities which might warrant their maintenance as being distinct from *Mesembryanthemum*.

Although this present work in no way pretends to have made a thorough study of these plants, we are of the opinion that all of the above listed genera should be treated as belonging in *Mesembryanthemum* as stated by Friedrich, 1968. Furthermore within *Mesembryanthemum*, the group of species previously placed in *Opophytum* should be given subgeneric or sectional status. However, the uniqueness of *Eurystigma* by nature of its broad and somewhat flattened stigmas requires further study to adequately accommodate it within a modified classification.

Based on this conclusion, *Mesembryanthemum* would therefore be distinguished by its axile (central) placentation, leaves not being connate at their base (except in the *Opophytum* group), the old leaves being deciduous, leaves opposite only at the base of the plant (or occasionally on flowering stems in *Opophytum* members), stem and leaves usually covered with papillae, stigmas filiform and capsules with valve wings present.

Mesembryanthemum setosum (L.Bol.) L.Bol. has been found to be a later homonym of *M. setosum* Moench, a species presently thought to be best placed in the genus *Delosperma*. It is difficult to understand how H.M.L. Bolus failed to notice the earlier species name since it is listed in

both *Index Kewensis* (Jackson, 1894) and *Flora Capensis* (Sonder, 1862). Regardless of how this oversight occurred, it is of necessity that specimens referred to this specific epithet be given another name.

Mesembryanthemum setosum (L.Bol.) L.Bol. (not Moench) is one of four species described simultaneously (under the genus *Cryophytum*) from specimens collected by P. Ross Frames on a trip from St. Helena Bay to Vanrhynsdorp of the western Cape in October, 1928. When *Cryophytum setosum* L.Bol. was transferred to *Mesembryanthemum* (1939), Bolus neglected to detect the previous name of Moench. As it was hoped to avoid another specific epithet under *Mesembryanthemum*, the four species, *M. rubroroseum*, *M. setosum*, *M. squamulosum* and *M. subtereticaule*, as well as *M. sedentiflorum* were closely compared morphologically.

A problem in studying *Mesembryanthemum* herbarium specimens is that the ontogenetic changes are infrequently represented. Many *Mesembryanthemum* species possess large, opposite, juvenile basal leaves whereas the mature, floral foliage is markedly smaller, alternate in arrangement and often differently shaped than the basal leaves. Consequently, studies of living specimens are the only manner in which to accurately compare these species.

With that caution to the present herbarium investigation, we have concluded that the specimens examined of the five previously listed species represent three taxa which can be separated on the basis of pubescence. We recognize *Mesembryanthemum sedentiflorum*, *M. subtereticaule* (with *M. rubroroseum* and *M. squamulosum* as synonyms) and the following species.

***Mesembryanthemum horridum* Koutnik & Lavis, nom. nov.**

Cryophytum setosum L. Bolus in Notes on Mesembrianthemum and Allied Genera 2: 53 (1929).

Mesembryanthemum setosum (L.Bol.) L. Bolus in Notes on Mesembryanthemum and Allied Genera 3: 168 (1939); non Moench, Supplementum ad Methodum Plantas 193. 1802.

Type: Between Klawer and Van Rhynsdorp, P. Ross Frames (BOL 18886) (BOL, holotype; BOL, isotypes).

Description as in Notes on Mesembrianthemum and Allied Genera 2: 53 (1929)

Mesembryanthemum horridum can be distinguished from the other two species by its possession of long (1–2 mm), acuminate papillae which are usually densely packed on the actively growing branches. *Mesembryanthemum subtereticaule* is sparsely papillose on all parts of the plant and *M. sedentiflorum* has basal leaves which are inconspicuously papillose and also young branches which have short, obtuse papillae.

DISCUSSION

As there has been no previous study of the genus *Mesembryanthemum* as delimited in this paper, an attempt was made to discover affinities among the over forty species (excluding those species previously treated as *Opophytum*) and group them into natural assemblages. From this effort, it is suggested that three groups emerge based primarily on leaf shape and reproductive strategy. Group A is distinguished by those annual species which possess terete or nearly terete leaves. Group B is intermediate between Group A and the following one by consisting primarily of annual species with flat leaves. Group C, the largest, includes biennial species with large, undulating leaves. The following lists of species indicate their assignment into one of the three groups.

Group A	Group B	Group C
<i>M. annuum</i> L.Bol.	<i>M. aitonis</i> Jacq.	<i>M. alatum</i> (L.Bol.)
<i>M. chrysium</i> L.Bol.	<i>M. breve</i> L.Bol.	L.Bol.
<i>M. dejagerae</i> (L.Bol.)	<i>M. clandestina</i> Haw.	<i>M. barklyi</i> N.E. Br.
L.Bol.	<i>M. cryocalyx</i> L.Bol.	<i>M. crystallinum</i> L.
<i>M. excavatum</i> (L.Bol.)	<i>M. inachabense</i> Engl.	<i>M. querichianum</i> Pax
L.Bol.	<i>M. lanceolatum</i> Haw.	<i>M. horridum</i> Koutnik &
<i>M. galpinii</i> (L.Bol.)	<i>M. louisae</i> L.Bol.	Lavis
L.Bol.	<i>M. paulum</i> (N.E. Br.)	<i>M. intransparens</i> L.Bol.
<i>M. inornatum</i> L.Bol.	L.Bol.	<i>M. karrooense</i> L.Bol.
<i>M. liebendalense</i> L.Bol.	<i>M. violense</i> L.Bol.	<i>M. latisepalum</i> (L.Bol.)
<i>M. linearifolium</i> L.Bol.		L.Bol.
<i>M. nodiflorum</i> L.		<i>M. macrophyllum</i> L.Bol.
<i>M. paucandrum</i> L.Bol.		<i>M. macrostigma</i> L.Bol.
<i>M. stenadrum</i> (L.Bol.)		<i>M. neilsoniae</i> (L.Bol.)
L.Bol.		L.Bol.
<i>M. subtruncatum</i> L.Bol.		<i>M. parvipapillatum</i> L.Bol.
		<i>M. pellitum</i> Friedr.
		<i>M. perlatum</i> Dtr.
		<i>M. purpureoroseum</i> L.Bol.
		<i>M. quinanguatum</i> L.Bol.
		<i>M. rhodanthum</i> L.Bol.
		<i>M. sedentiflorum</i> L.Bol.
		<i>M. subrigidum</i> L.Bol.
		<i>M. subtereticaule</i> L.Bol.

As this study was only preliminary, no formal classification is here proposed. It is hoped that this initial work will form the background necessary for a more exhaustive investigation. Much field work is required before adequate comparisons between populations, particularly in the Namaqualand region, can yield clearly defined specific delimitations. In addition, an herb-arium record consisting of a more complete representation is necessary in documenting the variability within the species.

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